SEAT BELT TENSION SENSOR

ABSTRACT

A seat belt tension sensor has an anchor, a seat belt tension receiver, a moving arm force responder, and an arm sensor. The seat belt tension receiver applies force from a seat belt to the force responder. The force responder is made of spring metal bent to have a base for receiving force and one or two arms that are urged to move by the received force. The arm sensor responds to the arm or arms by generating an electric signal. The anchor has an opening through which a seat belt, the seat belt tension receiver and the force responder pass. A cross member of the anchor spans the opening and withstands the large forces applied by the seat belt when the vehicle strikes an obstacle. An edge of the cross member is grooved to engage the base of the force responder in a way that provides low friction during flexing of the base. The base of the force responder operates as a low friction bearing for the movement of the seat belt tension receiver. A flexible suspension element made of spring metal operates as a second bearing and also operates as a preloading spring. In a preferred embodiment, the arm sensor comprises a semiconductor capacitance sensor responsive to the capacitance between two capacitor plates and two arms of a force responder. In a second preferred embodiment, the arm sensor comprises two permanent magnets movable with the arms of a force responder and a magnetic field sensor.